COVID-19 Shocks, Performance, and Financing Decisions : Panel Evidence from Indian Firms

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Abstract

Purpose : The lockdown and social distancing measures to alleviate the pressure on the healthcare sector to flatten the 2019-nCoV (COVID-19) curve had asymmetrically distressed the performance and short-term financing of Indian firms. This study looked at the performance and short-term debt ratio of the Indian manufacturing and services industries independently, attempting to diagnose the varied effects of COVID-19 regulations. The study also looked into the variations caused by exogenous shocks in the factors determining the short-term debt ratio.

Methodology : The study used linear panel data methods and the quarterly panel data of 4,536 enterprises from 2008–2009 to 2021–2022 to achieve its goals. The binary variables techniques were used to study the crisis period.

Findings : The results corroborate the notion that the crisis negatively and unevenly impacted Indian industries. For example, the performance of manufacturing companies fell to 69%, while the services sector saw a decline of up to 91%. Similar to how the short-term debt ratio decreased dramatically during the pandemic, the manufacturing sector saw a slight decline, or 0.0204, and the services sector saw a reduction, or 0.0244. The study also noted significant deviations in the determinants of short-term debt ratio; for instance, profit, size, and liquidity were the prime determinants of short-term debt ratio in manufacturing firms. At the same time, liquidity was the sole determinant of the short-term debt ratio for a service sector firm.

Theoretical, Managerial, and Practical Implications : The results indicated that the Indian firms were operating sub-optimally because of the demand and market and supply shocks during the COVID-19 period. However, the accessibility and easiness of the financing could help firms to work efficiently.

Originality : The biggest upheaval the companies have experienced is the COVID-19 problem. For the businesses, which are the vital sector of the economy, to continue operating throughout the recession, government assistance was necessary. The governments, however, had difficulty determining which areas ought to be prioritized for assistance in order to distribute the scarce resources at their disposal. Thus, it was intended for this study to report on the crucial areas of the companies for successful government interventions.

Keywords : **COVID-19, performance, profitability, financing mix**

JEL Classification Codes : G20, G32

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The Republic of China's Wuhan wet market, located in the Hubei province, was the site of a cluster of pneumonia-symptomatic patients that was reported in December 2019. Local and international agencies

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in the nation expressed concern over the sharply increasing number of patients and fatalities. According to Zhu et al. (2020), the Chinese health authorities notified WHO that COVID-19 is most likely the disease's carrier virus after conducting clinical studies of the patients with experts. In January 2020, the epidemic was deemed a humanitarian emergency by the Chinese government. COVID-19 is a Public Health Emergency of International Concern, according to the WHO, and it may be especially dangerous for nations with underdeveloped healthcare systems. The highly contagious nature and many possible carriers of the disease engrossed 110 countries across the globe till March 11, 2020 (WHO, 2020). As a result, the WHO declared the crisis a *Pandemic*[1]. Additionally, the WHO recommended that detection and isolation of patients, treatment and effective contact tracing might alleviate the transmission speed of the virus (Sohrabi et al., 2020). However, there was no proven cure available because the pandemic was relatively new to the world. In order to contain and lessen the outbreak, the nations implemented non-pharmaceutical measures (NPM) such as lockdowns, social distancing, and quarantines (Ferguson et al., 2020; Holshue et al., 2020).

The virus primarily spreads through air transport, and India is associated with the world through education, tourism, and work-related activities. So, India also reported the first confirmed case, a student from Kerala who returned from the epicenter on January 30, 2020[2]. High population density, rapid transmission, emigration of Indian people overseas, and repatriation of migrant workers to their home countries were all contributing factors to the COVID-19 pandemic's spread in India. Consequently, by the third week of March 2020, there were over 500 cases reported. The Indian government was forced to implement the recommended NPM in order to address the issue due to the weak healthcare system and related circumstances. As a result, on March 25, 2020, with over 525 instances, the Indian government implemented the largest lockdown in history. It was largely lifted during the first week of June 2020. In India, non-essential activities were suspended during the shutdown, and only necessary services were allowed (Sahoo & Ashwani, 2020).

India's health problem undoubtedly subsided as a result of the lockdown, but the country's economy entered a recession. Therefore, the risk associated with the lockout of both financial and physical assets was aggressively and negatively priced by the market players. Distinct research has been carried out for various market attitudes since the catastrophic effects of the crisis might not be adequately represented by a single figure. Studies have confirmed that the demand and supply mechanism through the global supply chain, trade links, and services has been affected by the extraordinary closure of the economy. For instance, Indian companies' micro-level financial accounts showed falling revenues, poorer performance, and a large debt load. Additionally, at the macro-level, the lockdown had devastating impacts on the fiscal deficit, inflation rate, bank credit, private investment, and unemployment rate (Dev & Sengupta, 2020; Rathore & Khanna, 2020; Sahoo & Ashwani, 2020).

The COVID-19 crisis is the most severe turmoil the firms have faced. The firms, the critical economy segment, required government intervention to operate uninterruptedly in the recession. The governments, however, encountered difficulties in determining which areas needed to be intervened in order to distribute the scarce resources at their disposal. The factors influencing Indian enterprises' SHDTA during COVID-19 and how they differed from typical times are not discussed in the literature. In order to close this gap and provide answers to these important concerns, the current study has been conducted.

Studies on COVID-19 and its Impacts

Social scientists have written a substantial amount of literature since the COVID-19 pandemic began. The most severe effects of the pandemic, according to studies, are said to be seen globally on two macroeconomic variables: employment and consumer spending. For instance, a prominent study using the Nielsen Homescan panel and

[1] https://www.who.int/emergencies/diseases/novel-coronavirus-2019
[2] https://pib.gov.in/pressreleaseiframepage.aspx?prid=1601095

survey data found that the unemployment rate rose by 5% in a short period, higher than the decline during the subprime crisis of 2008. Furthermore, there was a 31% decrease in consumer expenditure and a substantial rise in the default rate on retail loans. The other macroeconomic sentiments became negative as a result of these cascade impacts. Furthermore, market players switched from risky portfolio investments to safe investments as a result of the created uncertainty, which further reduced consumer spending (Baker et al., 2020; Mounir, 2024). Due to the pandemic, businesses have been obliged to save expenses by increasing both temporary and permanent layoffs of employees and by freezing new employment. However, a new class of workers was given employment opportunities by the businesses producing and distributing COVID-19 kits, masks, sanitizers, medications, and vaccine development. On the other hand, 3.8 new jobs could be created by this staff turnover, as opposed to 12.8 new jobs lost. Thus, the employment rate has been negatively impacted by the redistribution of jobs (Barrero et al., 2020).

It was believed that the global stock markets were the first to factor in the crisis's forecasts. Thus, the global stock markets have been adversely impacted by the pandemic. The timeliness of the governments' announced rescue packages was disproportionately correlated with the level of adversity. Thus, the pandemic had a significant impact on the financial markets in Asia, which was followed by the capital markets in the United States and the Middle East (Pandey, 2023; Topcu & Gulal, 2020). Demand and supply shocks brought on by the pandemic have also significantly increased uncertainty in equity pricing. According to Carlsson-Szlezak et al. (2020), researchers think that the crisis is succeeded by a "V" shaped recovery, in which the crisis initially displaces output and, after that, is fully absorbed.

Regulators have taken action in both the primary and secondary bond markets as a result of the bond market disruptions. The US agencies have implemented intervention measures, among them the primary and secondary markets' credit conversion variables. By increasing the dealers' intermediations, the government's measures have drastically decreased the risk premium. The government-purchased individual bonds, compared to exchange-traded bonds, have a significant role in creating liquidity in the market. However, the illiquidity problem could not disappear completely despite government purchasing (Boyarchenko et al., 2020; Kargar et al., 2020; O'Hara & Zhou, 2021). According to COVID-19, actively managed mutual funds (AMMFs) might not be utilized as hedging strategies during the pandemic. The studies reported that 74.2% of AMMFs have underperformed compared to passively managed mutual funds. However, the growth funds outperformed in contrast to value funds during the same period (Pástor & Vorsatz, 2020). Most importantly, the firms have faced disrupted cash inflows during the pandemic. As a result, in order to satisfy their immediate financial obligations, the companies first turned to banks.

Consequently, because of the use of the current credit line and its extension, the banks have seen a significant increase in the demand for credit. How much was borrowed was determined by the banks' and businesses' sizes. For instance, large firms and large banks were predominantly engaged in utilizing the credit line in comparison to small firms and small banks. Interestingly, despite the increasing demand for credit, the banks have been able to meet this demand on behalf of corporations because of additional funding provided by regulators and higher public deposits (Li et al., 2020).

In a similar vein, the analysis conducted for the European countries supported the idea that large banks had excess liquidity during the pandemic due to individual deposits, which suggested that people had cut back on their consumption. With the reduced consumption, the firms reported a significant decline in their sales. As a result, while this increase was unevenly spread across industries, the business bankruptcy rate increased by 8.8%. The industry's repercussions negatively impacted bank performance, and the banking sector's non-performing assets (NPAs) are on the rise. For example, NPAs increased by 10% in Italian banks, whereas NPAs decreased by 2.3% in Belgian banks. At the expense of 0.54 of the overall budget deficit, it is asserted that the regulators' action could lessen the severity of this situation (Gourinchas et al., 2020).

The COVID-19 created havoc among market participants and regulators because the pandemic was originated in China. The Chinese economy is an export-oriented country and provides a valuable supply chain to the rest of the world. Lockdowns and social distancing measures were implemented while the pandemic was limited to China. The world was badly impacted by these actions, which upset the world's supply system. As a result, investors punished US companies' stocks that had any functional or ownership ties to China. The penalty was higher in the initial period when China imposed restrictions on the movement of manpower and goods. However, when China relaxed the restrictions, and other countries imposed lockdowns and social distancing, the penalty was converted into rewards (Ramelli & Wagner, 2020).

Firms have been obliged to deal with a liquidity constraint and excessive loan demand in order to survive since the exogenous COVID-19 shocks eliminated the available cash inflows, which led to unmet fixed operating costs. As a result, the market players became excessively risk-averse and punished the financially troubled and low-quality companies (mostly bond companies with a BBB rating). Nonetheless, investors benefited from blue-chip companies with strong creditworthiness, which are usually AAA-rated bond companies, and they had no trouble obtaining loans (Acharya & Steffen, 2020). In the same way, a company with flexible finances is less likely to default than one without. Because of this, during the crisis, flexible enterprises fared better than non-flexible ones. In addition, the crisis caused the highly leveraged companies, which were mostly non-financial flexible firms, to fail. That being said, when the bailout packages were revealed, they had exceptionally good performance (Fahlenbrach et al., 2020). Surprisingly, it was argued in the literature that the environment and social ratings of the firm might lessen the impact of COVID-19 shocks. A high environment and social-rated firm generated a higher return, significant profit margin, and lower volatility than a low environment and social-rated firm during the first quarter of 2020. Furthermore, the study's findings indicate that the stakeholders of the high-rated environment and social firm showed their loyalty during the unprecedented shocks (Albuquerque et al., 2020).

Globalization has made it possible for Indian businesses to purchase production inputs from around the world at significantly cheaper costs. But as the disruptions have shown, Indian businesses' operations are extremely vulnerable to supply shocks brought on by global unrest. For the COVID-19 pandemic, comparable patterns were noted. When firms expressed their inability to render the factors to operate continuously, the crisis persuaded firms to face additional default risk. Supply chain disruption was the mechanism via which default risk spread during the crisis. For instance, the Indian manufacturing sector exports its finished commodities to the rest of the world market and imports intermediate items from the Chinese economy. The pandemic's impact on China's supply chain caused a notable decline in capacity utilization and sales revenue for the Indian manufacturing sector (Dev & Sengupta, 2020; Rathore & Khanna, 2020; Sahoo & Ashwani, 2020).

Scholars from India and other countries have evaluated the financial and societal consequences resulting from the pandemic. The majority of the research has concentrated on aggregate metrics, including supply chain disruptions, the labor market, the stock market, and macroeconomic indicators. What impact has the epidemic had on Indian companies' SHDTA and profitability? What variables affect Indian companies' SHDTA in COVID-19, and how are they different from ordinary times? These are the crucial questions lurking for the attention of the researchers. Therefore, this analysis enriched the literature by answering these critical questions using a novel dataset of 4,536 Indian manufacturing and service firms. The study used quarterly data from the first quarter of 2021–2022 to the third quarter of the 2008–2009 accounting year. The COVID-19 pandemic period is defined as the last quarter of 2019–2020 and the first two quarters of 2020–2021 in the quarterly statistics. For both the empirical and estimation analyses, the study used linear models.

Data Description and Descriptive Statistics

The sample used in the empirical analysis is explained in more detail in this section. The CMIE-PROWESS®

database provided the financial data used in this study. Since banking and leasing companies' debt ratios are strictly regulated and cannot be compared to those of non-financial companies, the study routinely removes their data from analysis. Initially, the quarterly financial data for 40,177 firms, starting from the third quarter of the accounting year 2008–2009 and ending in the first quarter of the accounting year 2021–2022, has been considered for the study. However, the study's sample of 4,536 enterprises for empirical analysis remains once the variables were constructed and missing values were eliminated. There are 1,885 enterprises in the services sector and 2,651 firms in the industrial sector, totaling the number of firms out of the 150,577 observations that were made during the study. The completed dataset is winsorized at 1% from each tail to remove the extreme outliers. To demonstrate the diversity of the enterprises, Table 1 lists the firms according to their industry.

Table 1 shows that of all the manufacturing enterprises, the largest number are in the chemical industry (584), with textiles (349), food and agriculture (334), and construction (333) following closely behind. The remaining sectors comprise companies ranging from 23 to 282. Furthermore, the services sector's sample contains the greatest proportion of businesses from wholesale and retail (861) and other sectors, followed by the miscellaneous sector (504). The services sector accounts for between 28 and 246 of the sectoral mix of the remaining businesses.

Table 1. ***Sectoral Presentation of the Firms in the Sample***

Manufacturing Firms		
Name of the Sector	**Number of Firms**	**Observations**
Chemicals and chemical products	584	19,726
Construction materials	125	4,968
Construction and real estate	333	10,295
Consumer goods	143	4,790
Diversified manufacturing	23	878
Electricity	35	1,077
Food and agro-based products	334	11,472
Machinery	282	10,482
Metals and metal products	130	4,644
Mining	41	1,503
Miscellaneous manufacturing	113	4,331
Textiles	349	13,539
Transport equipment	159	6,637
Total manufacturing firms	2,652	94,342
Services Firms		
Communication services	28	990
Diversified services	97	3,044
Hotel and tourism	86	2,968
Information technology	246	8,108
Miscellaneous services	504	13,799
Transport services	63	2,104
Wholesale and retail trading	861	25,222
Total services firms	1,885	56,235

The sectoral composition of the sample indicates that it is diverse and representative of all Indian economic sectors.

The unique characteristics of the industrial and service industries cause the drivers of performance and SHDTA to differ. In contrast to corporations in the services industry, manufacturing enterprises often have a higher proportion of tangible assets on their balance sheet. In addition, the working capital needs of servicing businesses are higher than those of the manufacturing sector. As a result, the manufacturing and service sectors are separated inside the sample.

According to the body of research, the main inversely impacted indicators during the COVID-19 crisis were sales, profit, employment, and the interest burden on outstanding debt. Consequently, it is worthwhile to display the panel time series plots of the important variables before starting the empirical investigation of the firms' performance and SHDTA. Therefore, the following section contains the graphs for these variables, specifically for the COVID-19 period.

Impact of COVID-19 on Firm's Performance

The COVID-19 pandemic was initially believed to be limited to China and under the control of Chinese authorities in early 2020. However, the WHO's declaration of the pandemic and the Chinese government's implementation of a lockdown attracted the attention of world economic leaders.

As seen by Figures 1–8 and the related subplots, the companies experienced major interruptions as a result of the Indian government's enforcement of COVID-19 limitations to address the health issue. For instance, supply disruptions were brought about by a shortage of migrant capital and labor. However, there was a significant drop in stakeholders' disposable income, which led to market and demand shocks. These policies have severely impacted the performance and funding requirements of Indian businesses. These measures have wrought havoc on the performance and financing needs of Indian firms. Moreover, the severity of COVID-19 was high for Indian firms because, coincidently, the pandemic was experienced when the country's growth rate was falling, corporate revenues were declining, and the unemployment rate and fiscal deficit were rising (Dev & Sengupta, 2020).

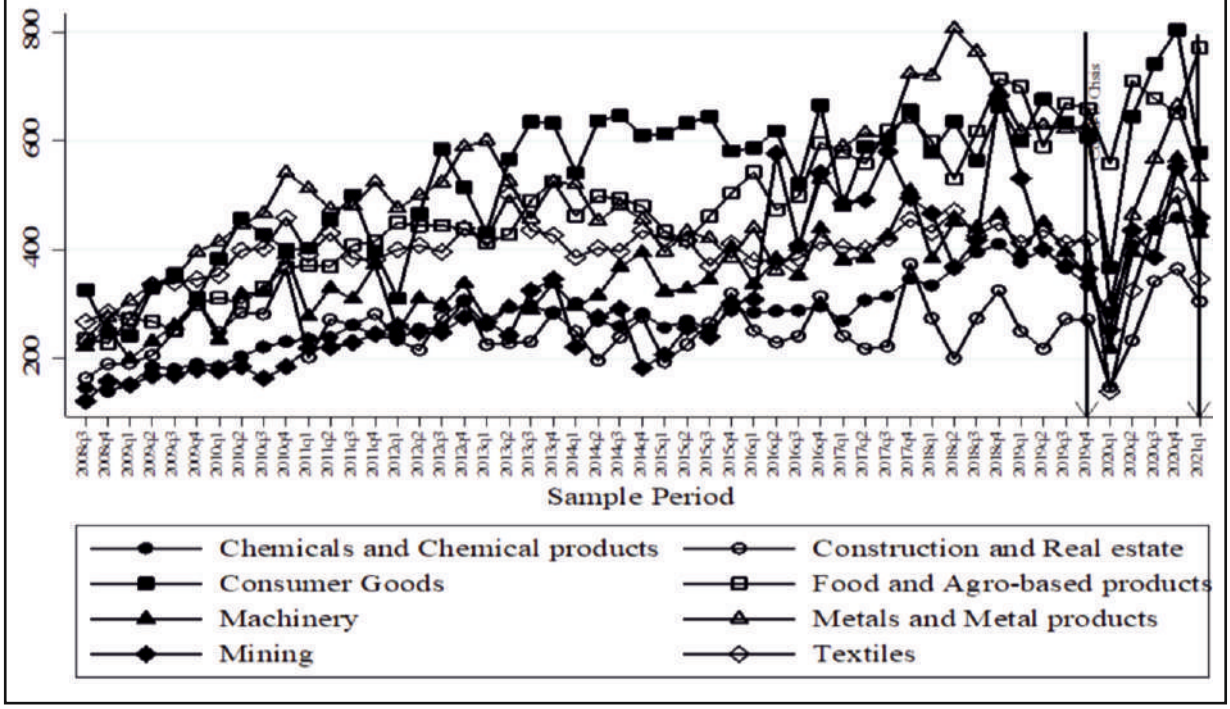
The figures also depict that the costs of lockdown and social distancing are reflected in the companies' performances at the end of the first quarter of 2020–2021. The reduction in sales and profits of the firms spurred the waves of layoff of the workers, which is reflected by the reduction in expenses by firms on salaries and wages. According to the data, the crisis's negative consequences lessened after the government lifted the lockdown in some areas of India and partially loosened social separation rules in others, i.e., until the quarter ended on March 31, 2021. However, the second wave in India, which occurred in April and May 2021, had a negative impact on the funding and performance of Indian businesses.

The plots show that the COVID-19 situation has a heterogeneous distribution of severity across Indian industries, which is consistent with the fact that certain enterprises are more severely impacted than others. For instance, businesses in sectors like hospitality, logistics, and tourism that depend on human contact and had to close down entirely were more vulnerable to the crisis than businesses in sectors like healthcare and pharmaceuticals that could continue to operate either partially or fully. Figure 1(a) and (b) specifically show the sharp fall in sales revenue of manufacturing industries, including transportation (–69%), textile (–66%), metals (–52%), construction activities (–46%), consumer goods (–39%), machinery (–38%), and mining (–30%). There was a decrease of (–15%) to (–16%) in the building materials, food, and agro-based industries. However, it is also evident that the chemicals industry saw the slowest revenue decline throughout this time, and the energy sector claimed a 10% rise.

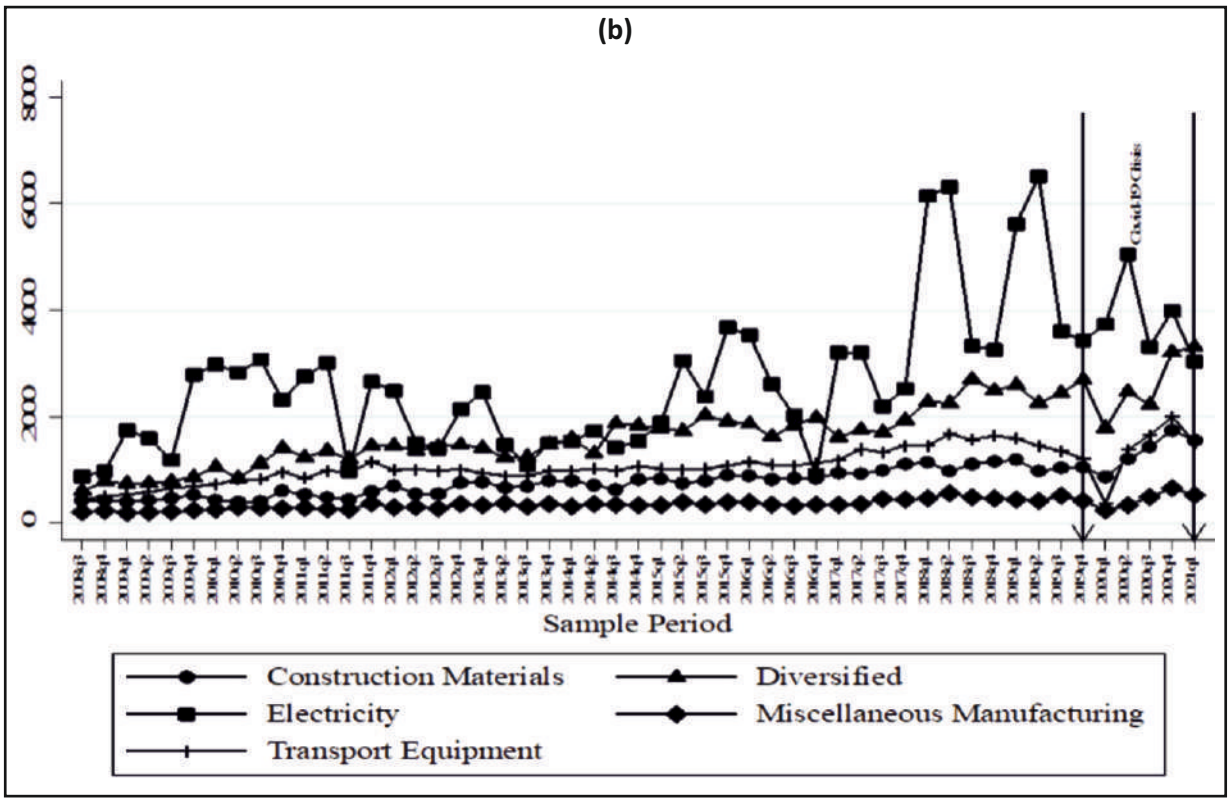
The services sectors were also affected adversely by the COVID-19 crisis and reported heterogeneous performance akin to manufacturing. The industries that depend on direct human connection, such as hotels

Figure 1. ***Sales of the Manufacturing Firms***

(a)



(b)



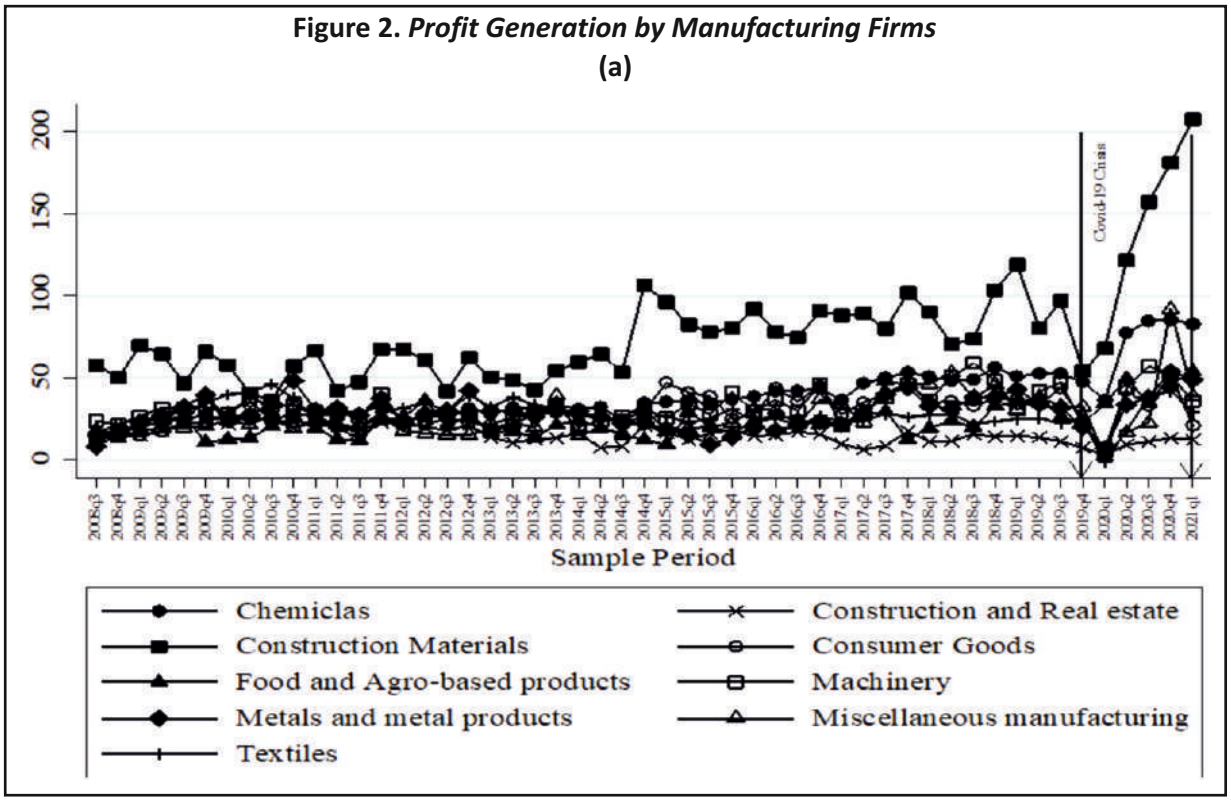
(–91%), transportation (–43%), wholesale and retail (–42%), diversified (–44%), and miscellaneous (–30%) are among the services sectors (Figures 5(a) and (b)) that have seen a sharp drop in income. These observations further support the conclusions drawn by Chaudhary et al. (2020). During this time, the IT sector was the only one to see a 10% increase in income. The lack of labor force availability, especially among migrant workers who returned to their homeland and home-based workers, maybe the compelling cause of the decline in performance. Furthermore, despite having disposable income during the crisis, it is suggested that consumers prioritized their needs for health and safety above all other types of demands. Thus, there was a notable drop in profit recorded by the services sector.

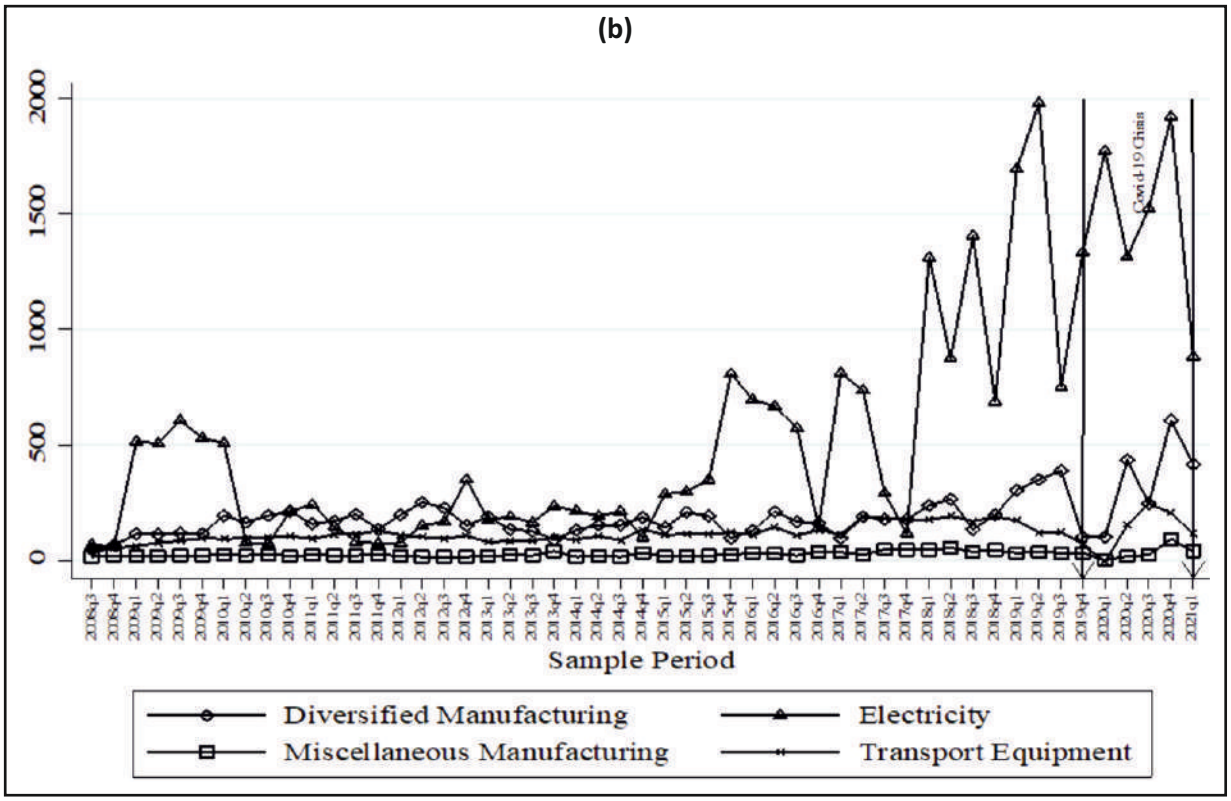
Since businesses can only make money through sales, they must incur expenses everywhere else. These expenses include fixed operational costs, salaries, rent, and interest on borrowed capital. Businesses report a major decline in liquidity and depletion of current cash flows when they receive no revenue or very little revenue. Similarly, the cascading effects of reduced sales were seen in the Indian firm's profits, interest expenses and payment towards salaries and wages. The result was a sharp decline in the companies' profitability (Figures 2(a) and (b), Figures 6(a) and (b)). Among all, the transport equipment (–107%) and textile (–104%) sectors were severely affected by the lockdown and social distancing and reported the highest fall in performance. These sectors generally have lower cash flows and supplementary short-term and long-term loans than other firms. For the services sector, as anticipated, the hotel industry experienced the highest decline in profit (–167%), followed by diversified (–78%) and wholesale and retail (–75%) sectors, whereas the other services sectors reported a decline in profit within the range of (–4%) to (–42%).

The immediate effect of the halted revenue and profits negatively affected the s*alaries and wages* head expenses of the firms. All sectors of the Indian economy have reduced their payments to the workers, as indicated

Figure 2. ***Profit Generation by Manufacturing Firms***

(a)





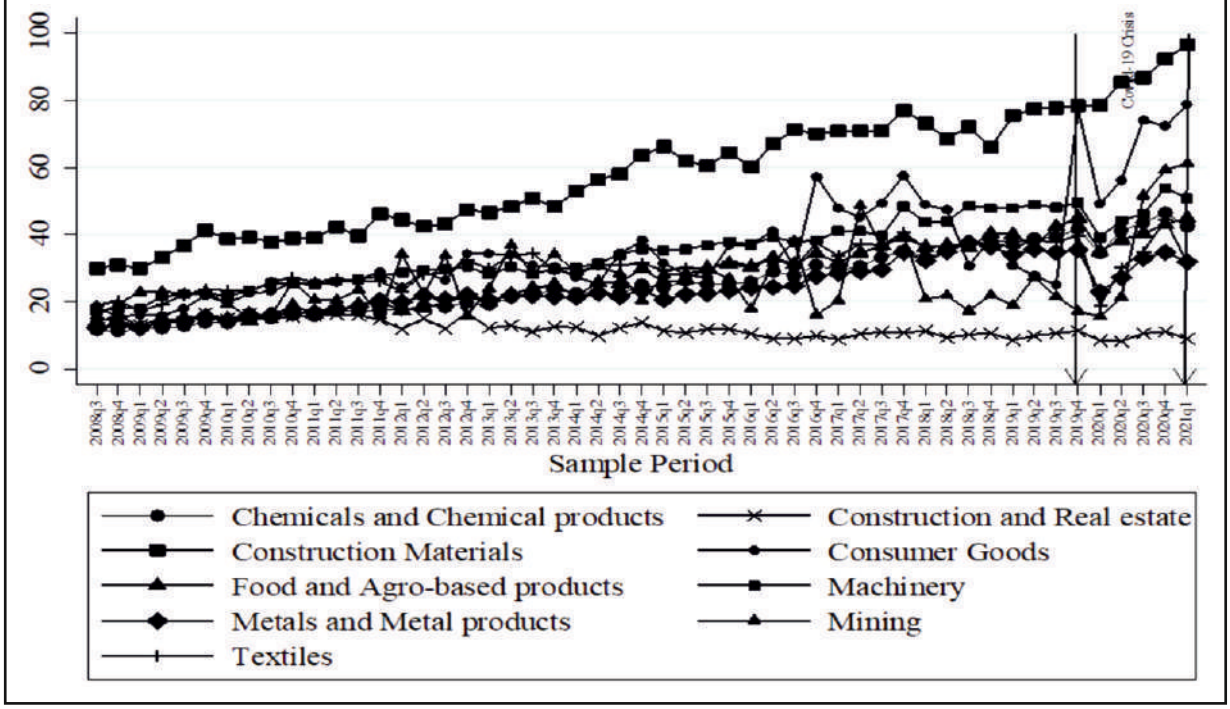
by the plots (Figures 3(a) and (b), Figures 7(a) and (b)). A decrease in pay and earnings was felt in the range of (–1% to –52%). The drop in salary bills by more than a quarter was experienced by the textiles sector (–52%) followed by consumer goods (–36%), metals (–35%), miscellaneous (–29%), transport equipment (–25%), and construction-related activities. The rest of the manufacturing sectors witnessed a fall in salary from (–1%) to (–22%). The same patterns of decline were observed for the services sector, and a significant decline in the salary expenses was experienced by the hotels (–41%), diversified (–36%), wholesale and retail businesses (–23%), and miscellaneous (–20%) industries. Furthermore, during the second quarter of the fiscal year that concluded on September 30, 2020, there was a significant decrease in salary expenditures, even though the services sector in India had a slight increase in sales income and profits.

The graphical representations in Figures 4(a)–(c) as well as Figures 8(a) and (b) further imply that the companies have lowered the interest payments on the loans. The energy (–67%), machinery (–32%), miscellaneous (–21%), transport equipment (–20%), and textiles (–19%) segments saw the largest decrease in interest expenditure. In the case of services firms, the highest decline in the interest payments was experienced by the hotels (–23%), transport (–11%) and wholesale and retail businesses (–19%).

In summary, it is believed that Indian businesses desperately needed cashflows to continue operating throughout the pandemic. The two most important types of funding that a company may obtain are debt and equity; therefore, during the crisis, when equity values were historically low, the companies refrained from taking on new ventures. The banking sector in such a situation provides an alternate route of finance; there also the Indian firms struggled, as it is visible from Figure 9 that before the crisis, the credit growth of the banking sectors declined substantially. Furthermore, increasing NPAs, credit to highly leveraged enterprises, defaults by non-banking financial organizations, and Indian banks' excessive risk aversion have all created barriers for Indian businesses seeking financing from the banking sector. The current obstacles prevented the Indian sector's credit expansion

Figure 3. ***Salary and Wage Expenses of Manufacturing Firms***

(a)



(b)

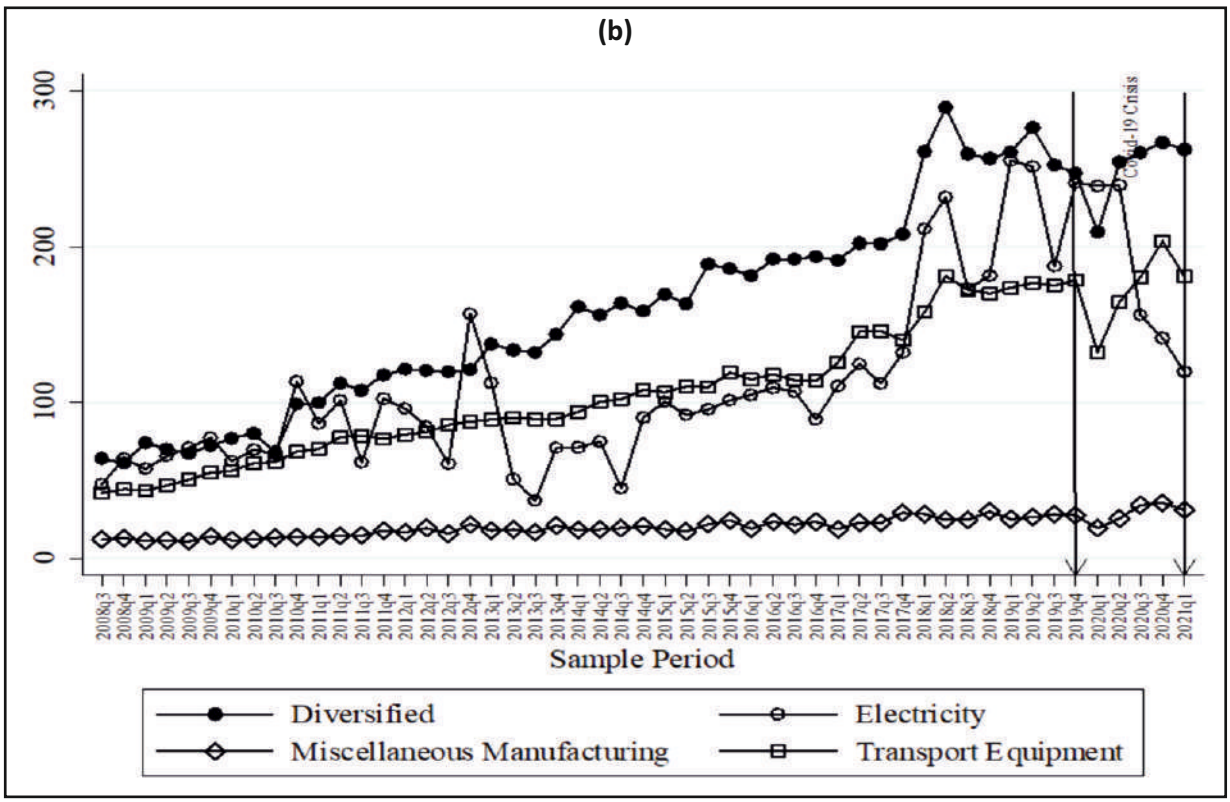
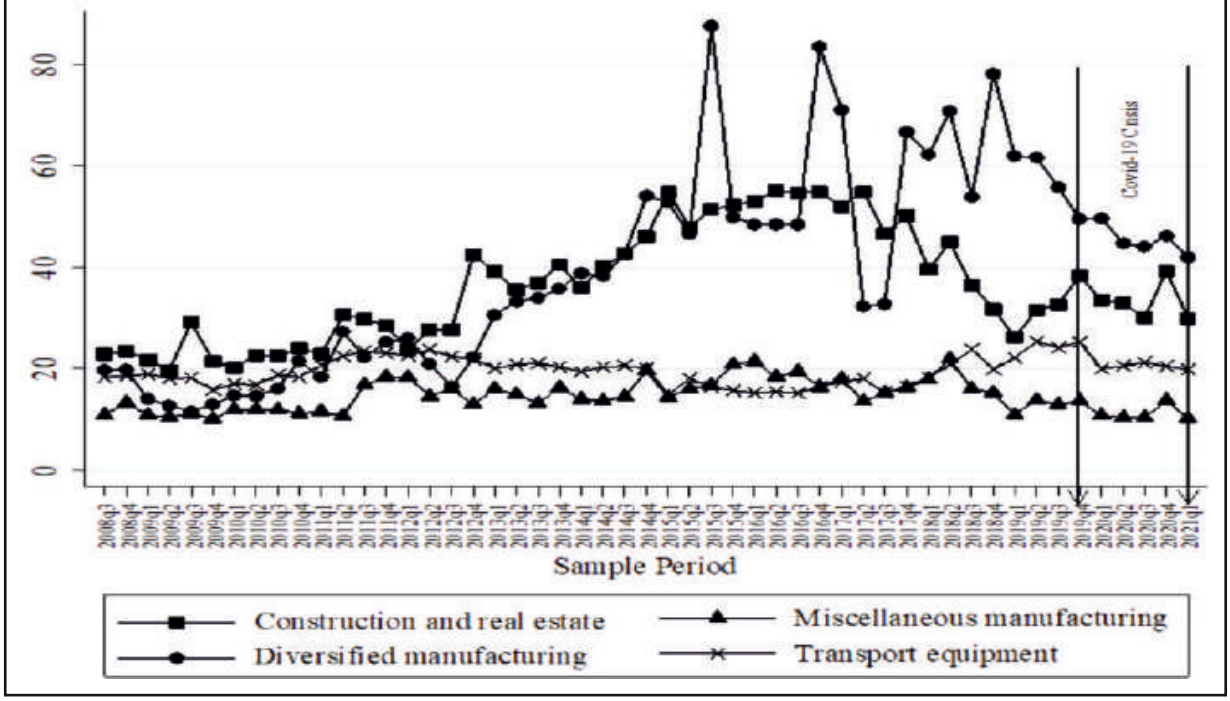


Figure 4. ***Interest Expenses of Manufacturing Firms***

(a)



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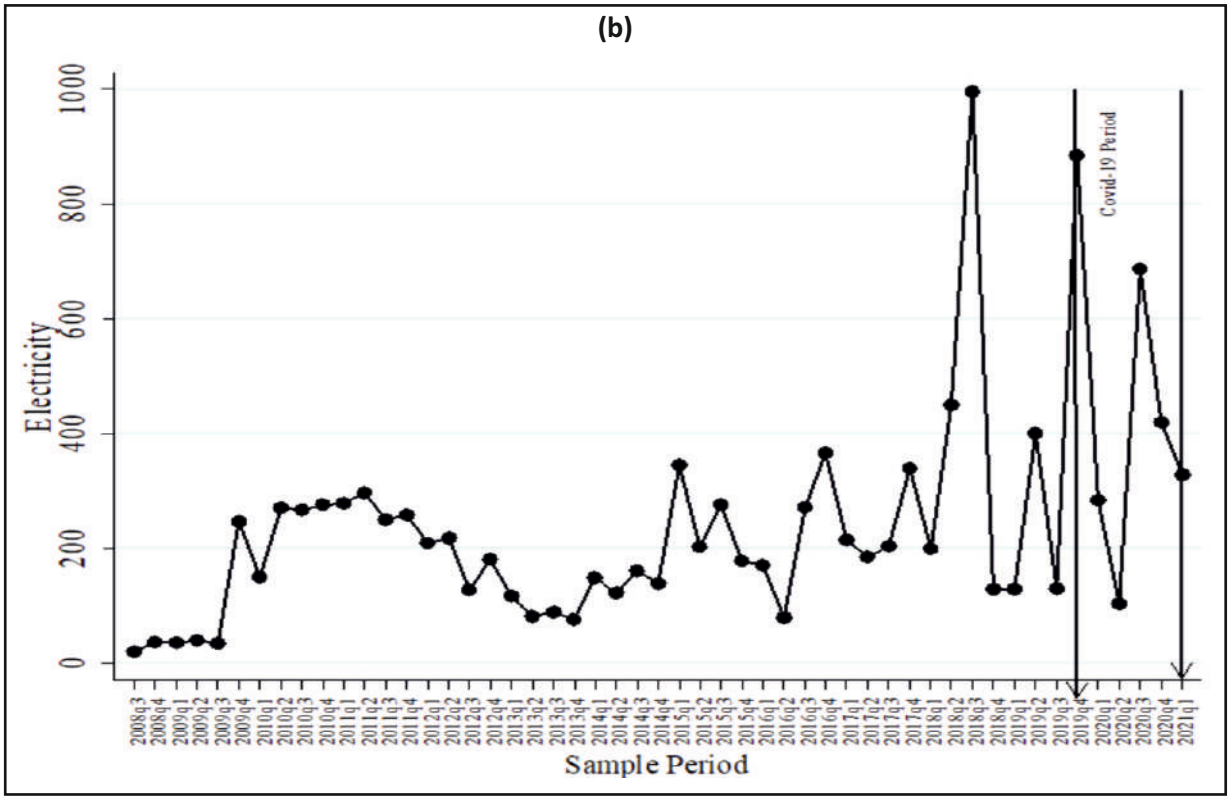


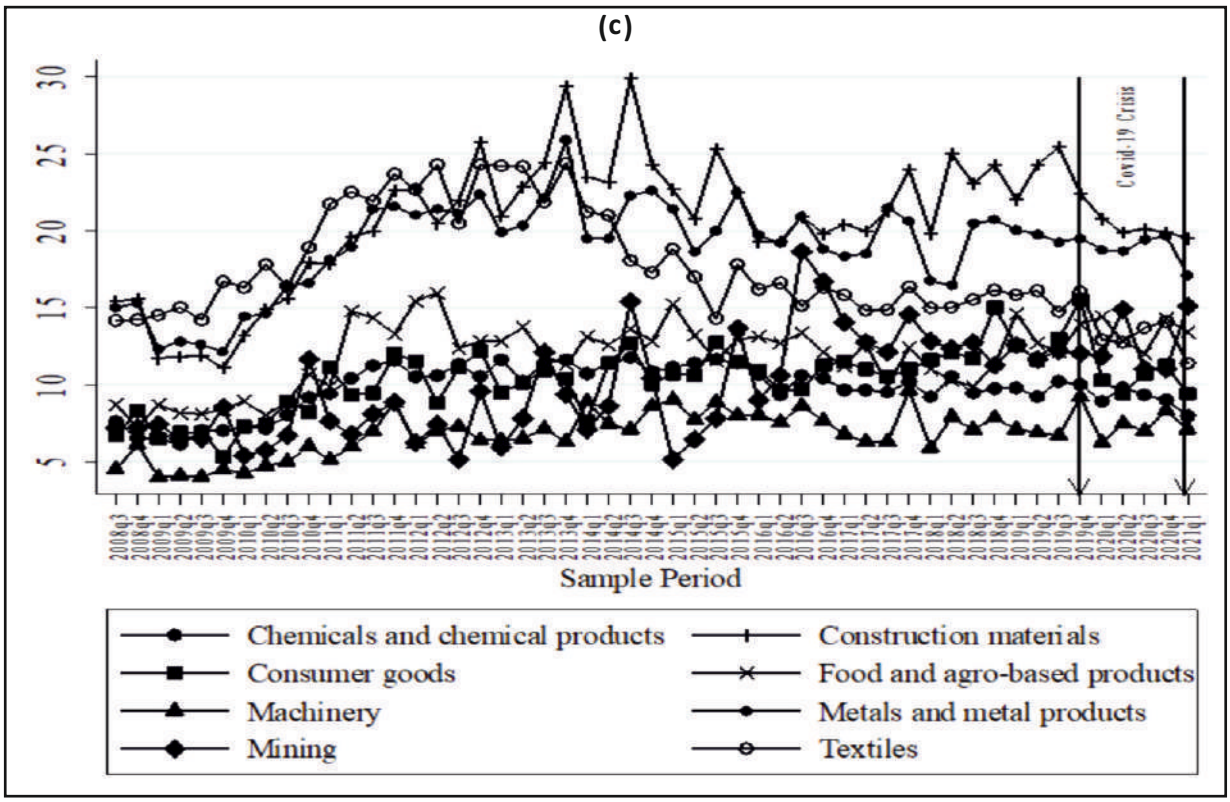
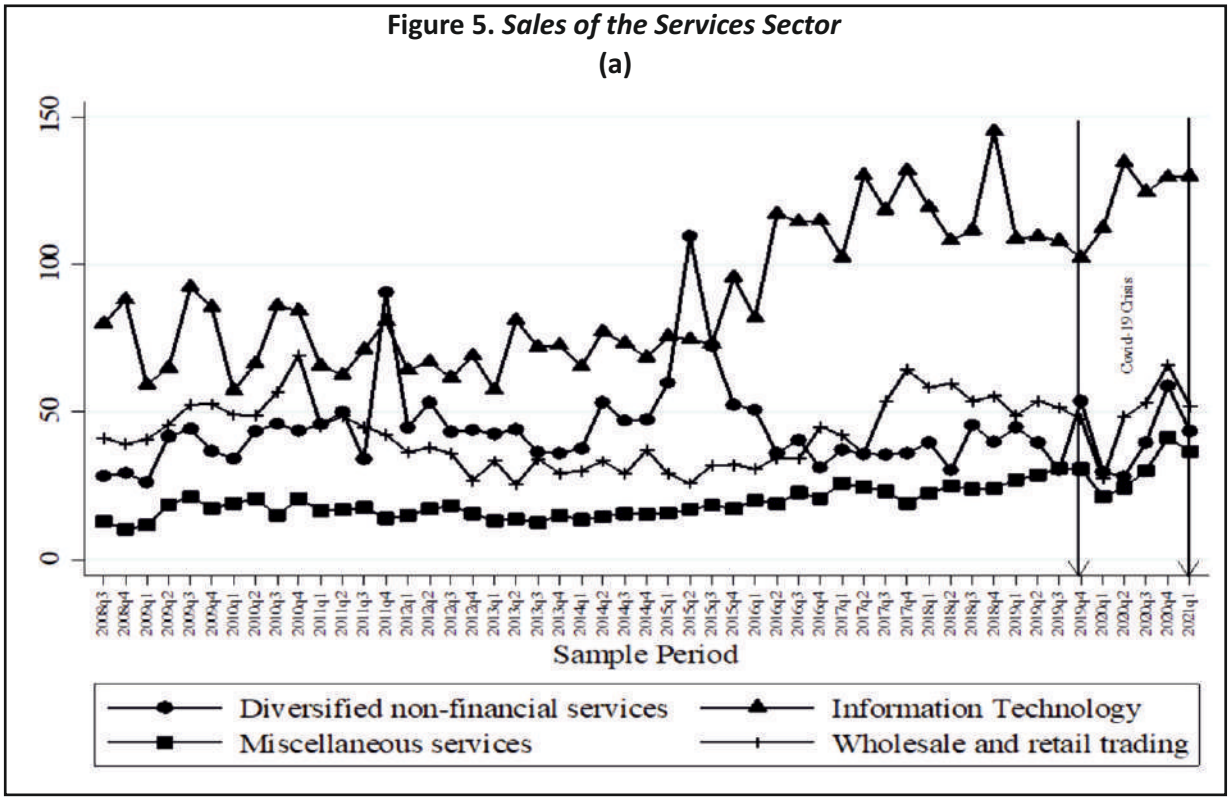


Figure 5. ***Sales of the Services Sector***



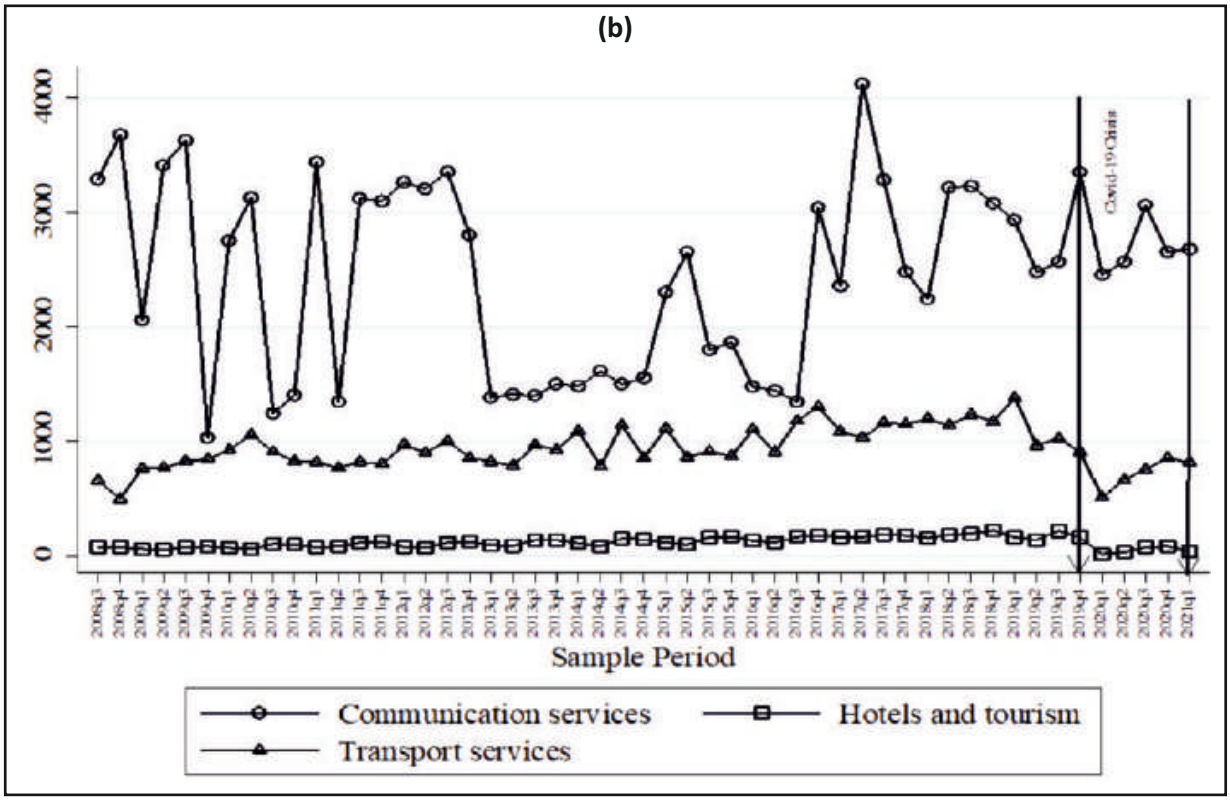
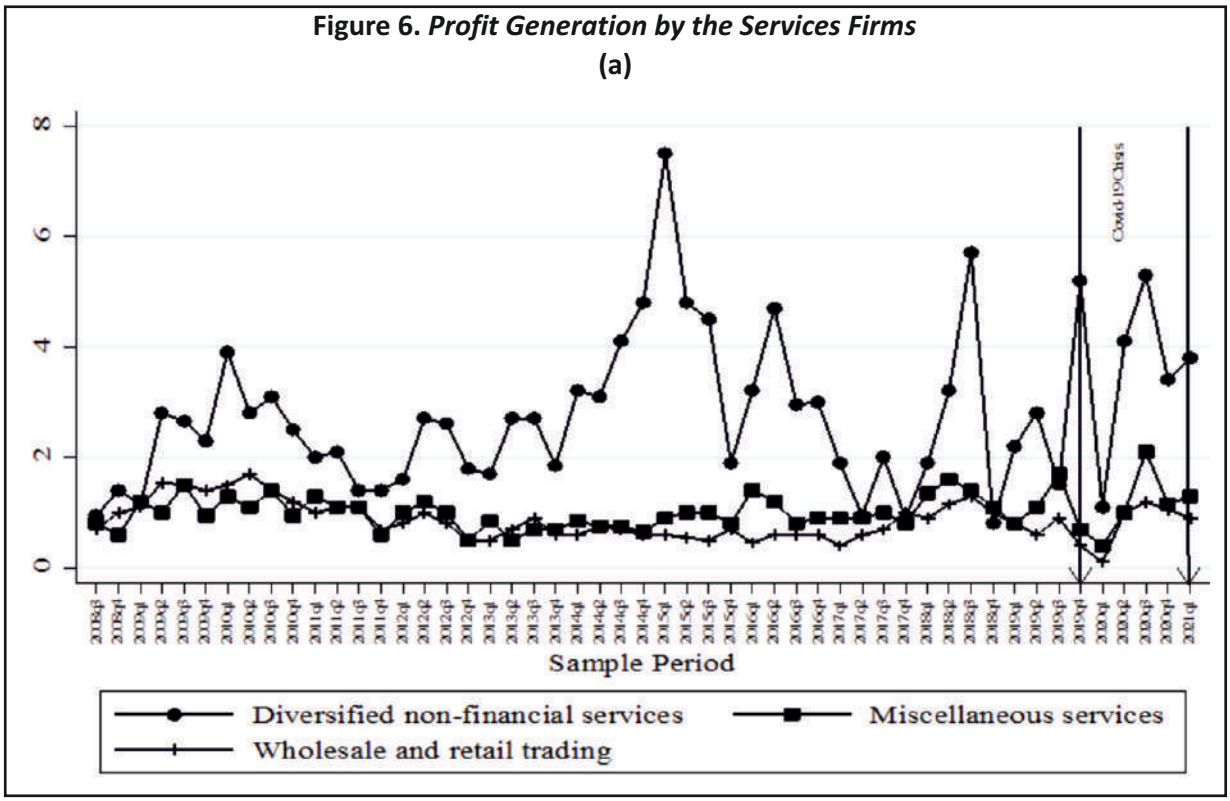
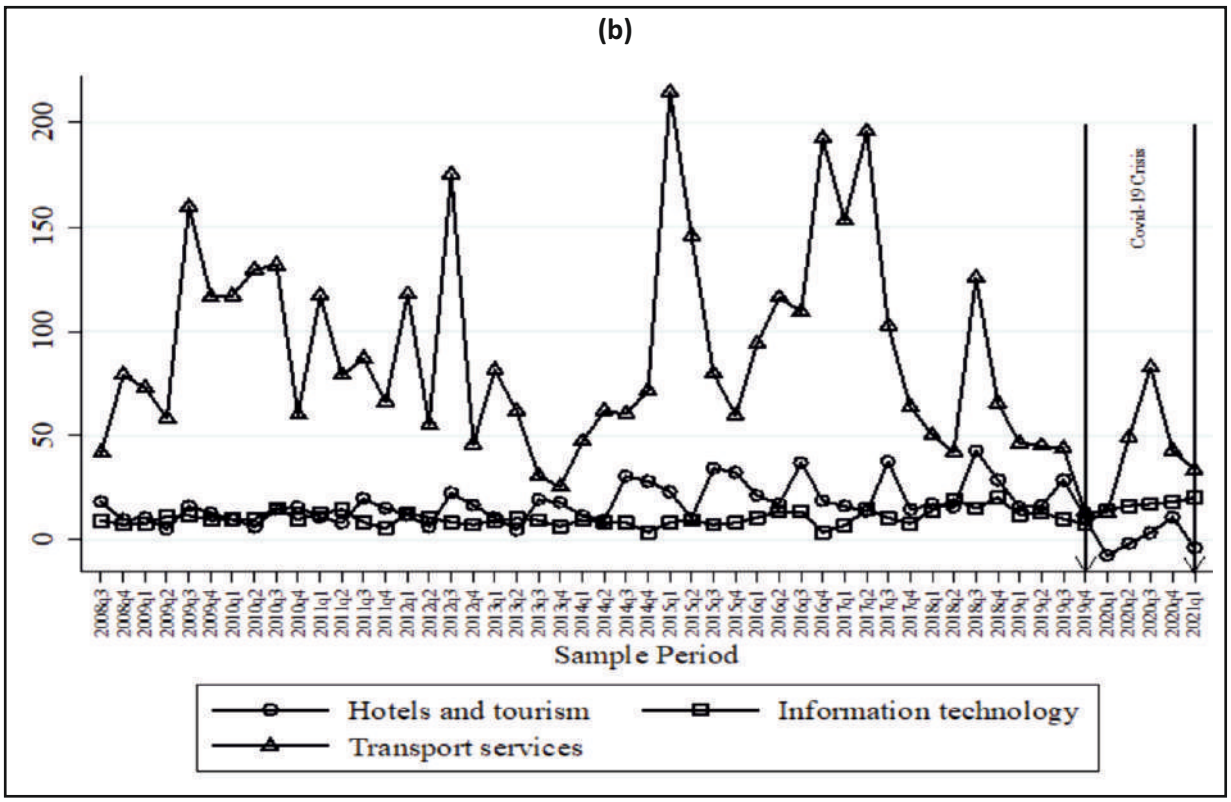


Figure 6. ***Profit Generation by the Services Firms***




(b)
0
50
100
150
200
Covid-19 Crisis
Sample Period
Hotels and tourism
Information technology
Transport services

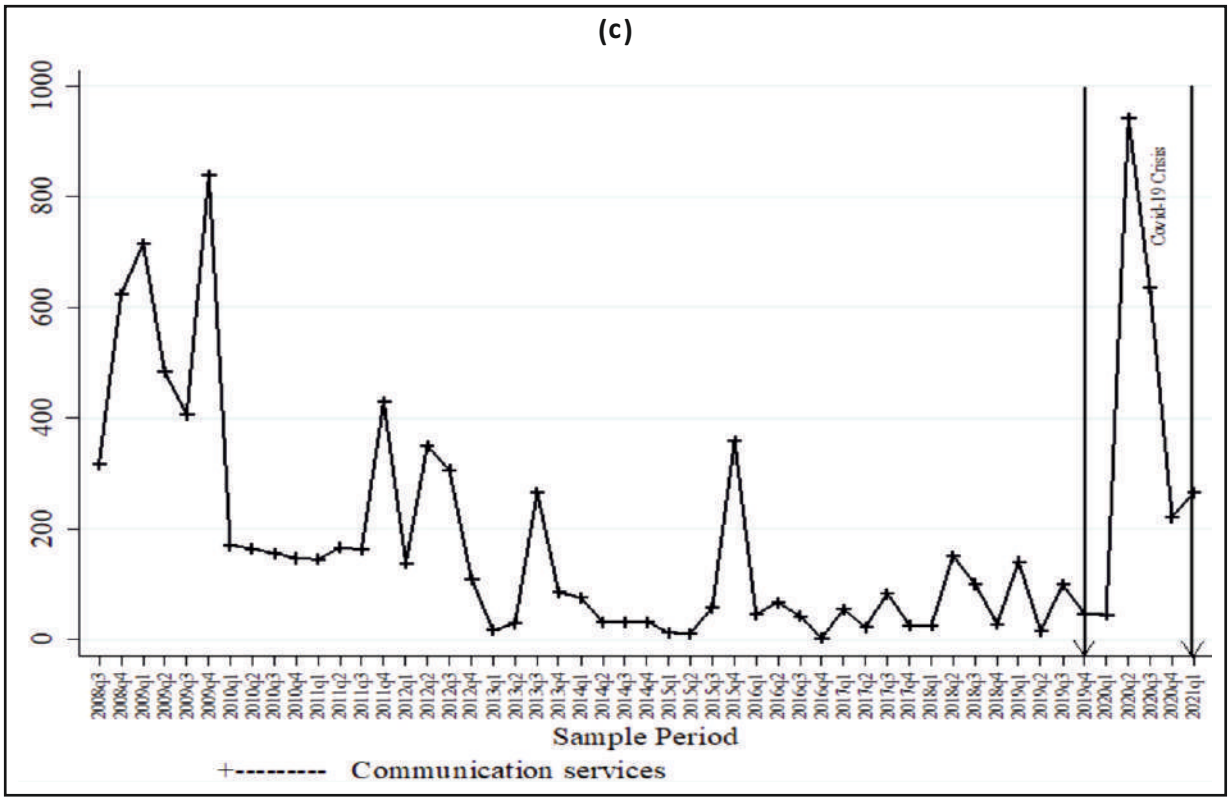
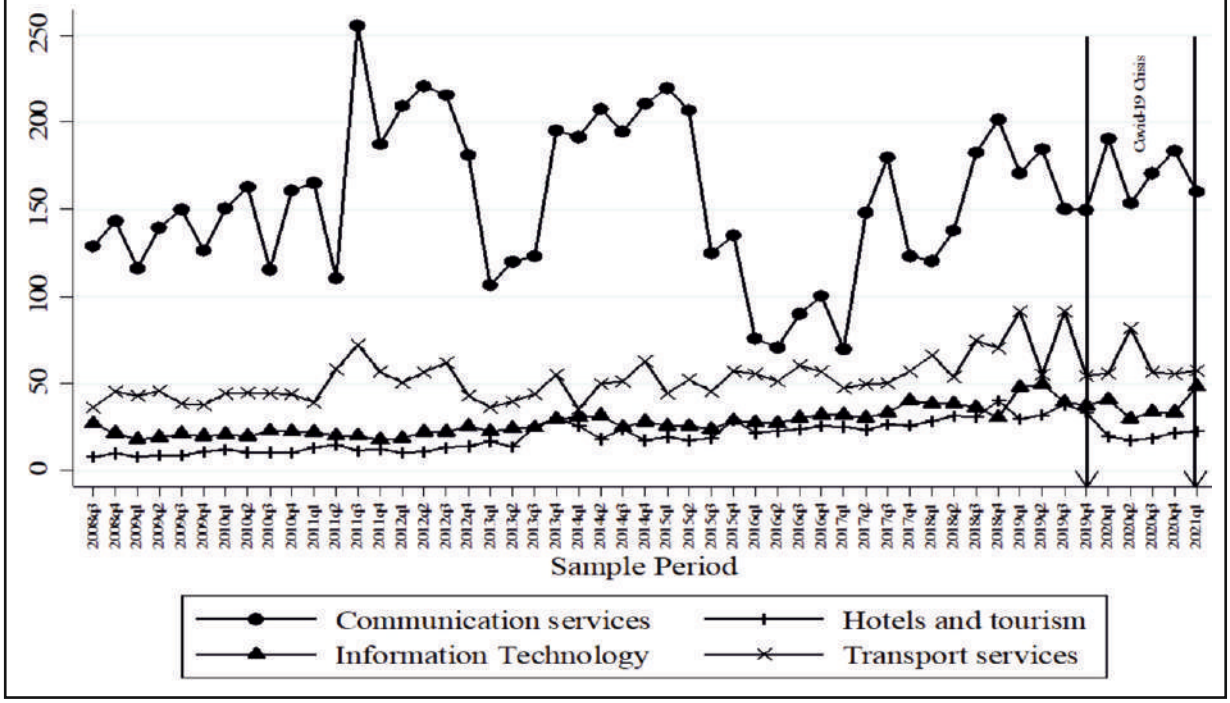

(c)
0
200
400
600
800
1000
Covid-19 Crisis
Sample Period
Communication services

Figure 7. ***Salary and Wage Expenses of Services Sectors***

(a)



(b)

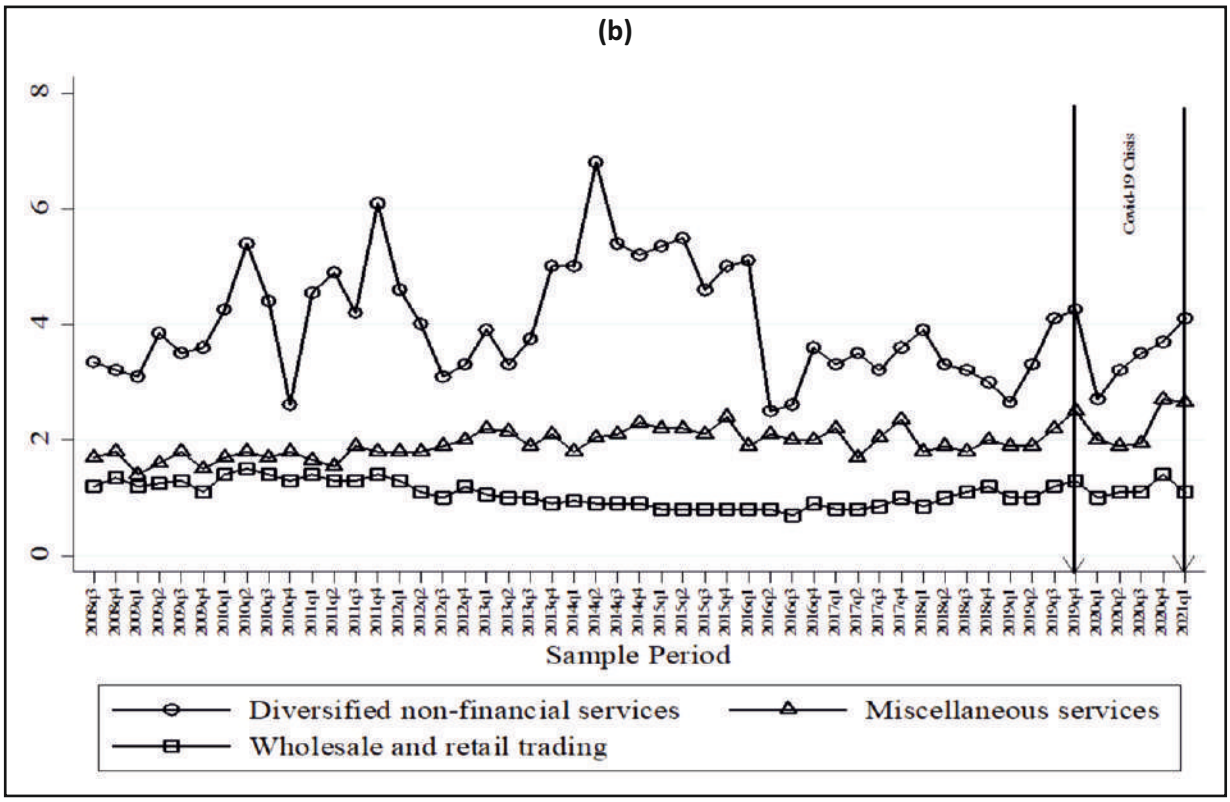
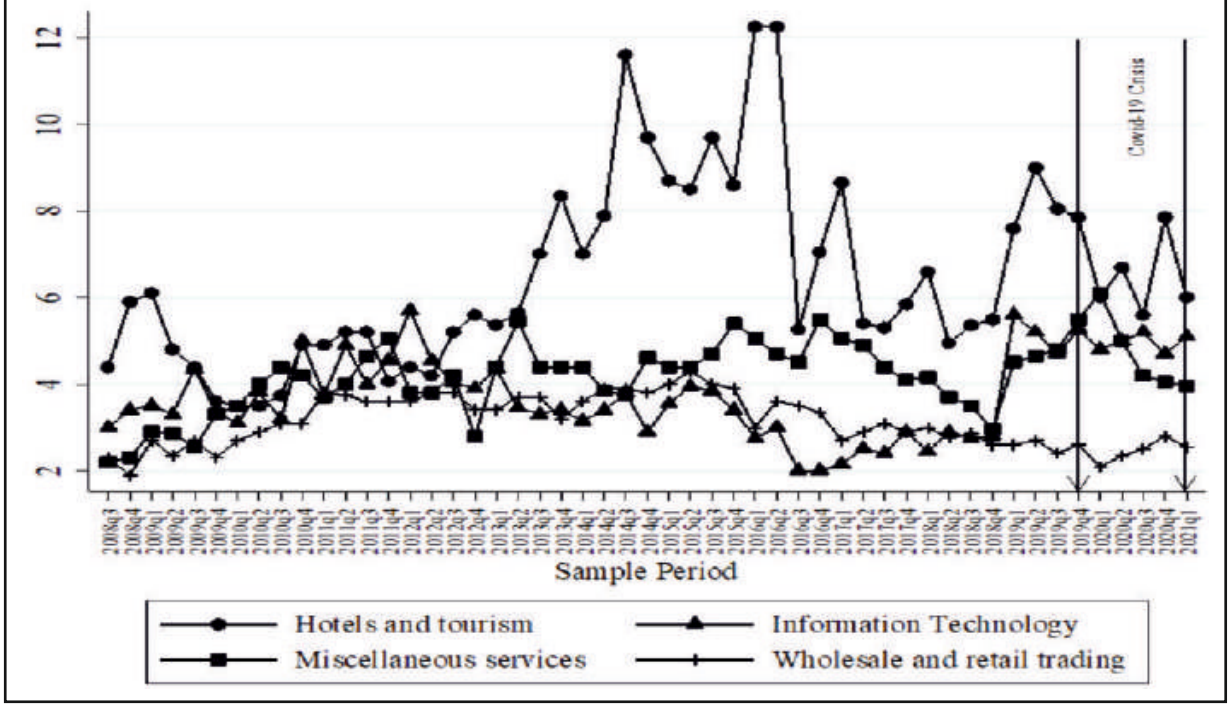


Figure 8. ***Interest Expenses of Services Firms***

(a)



(b)

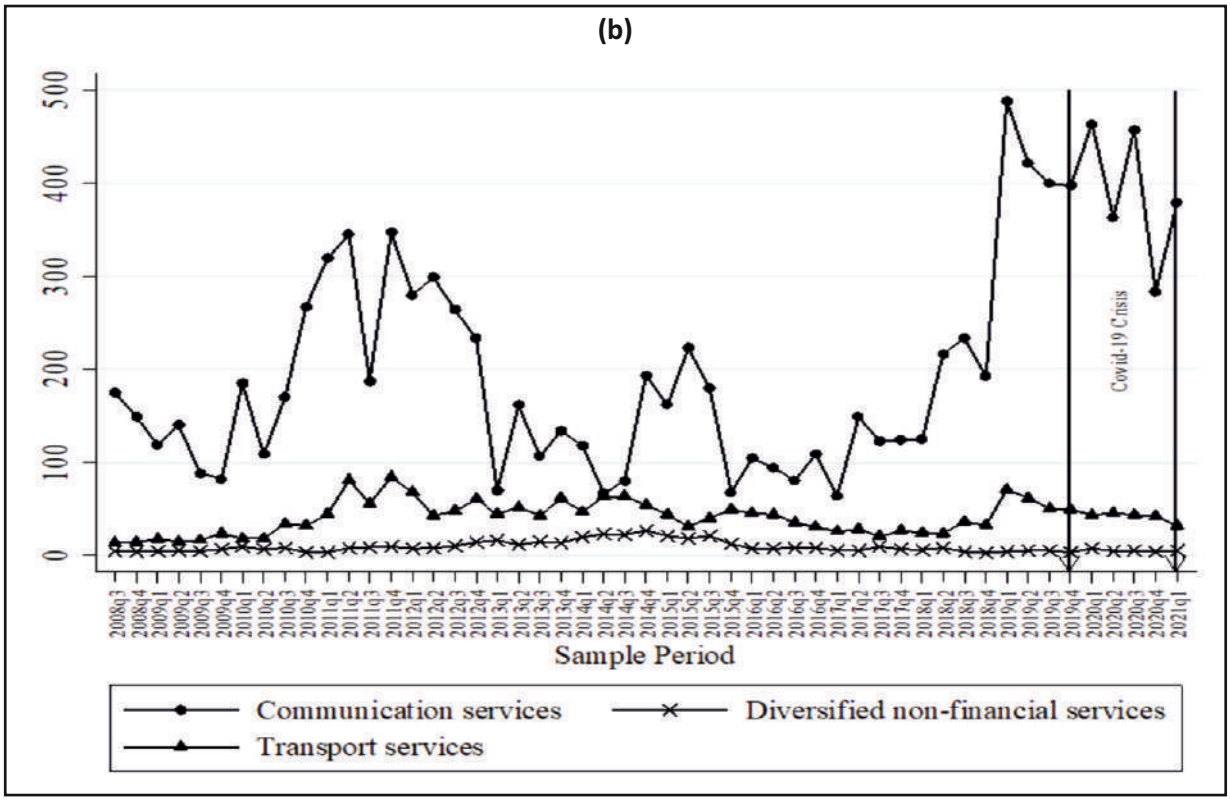
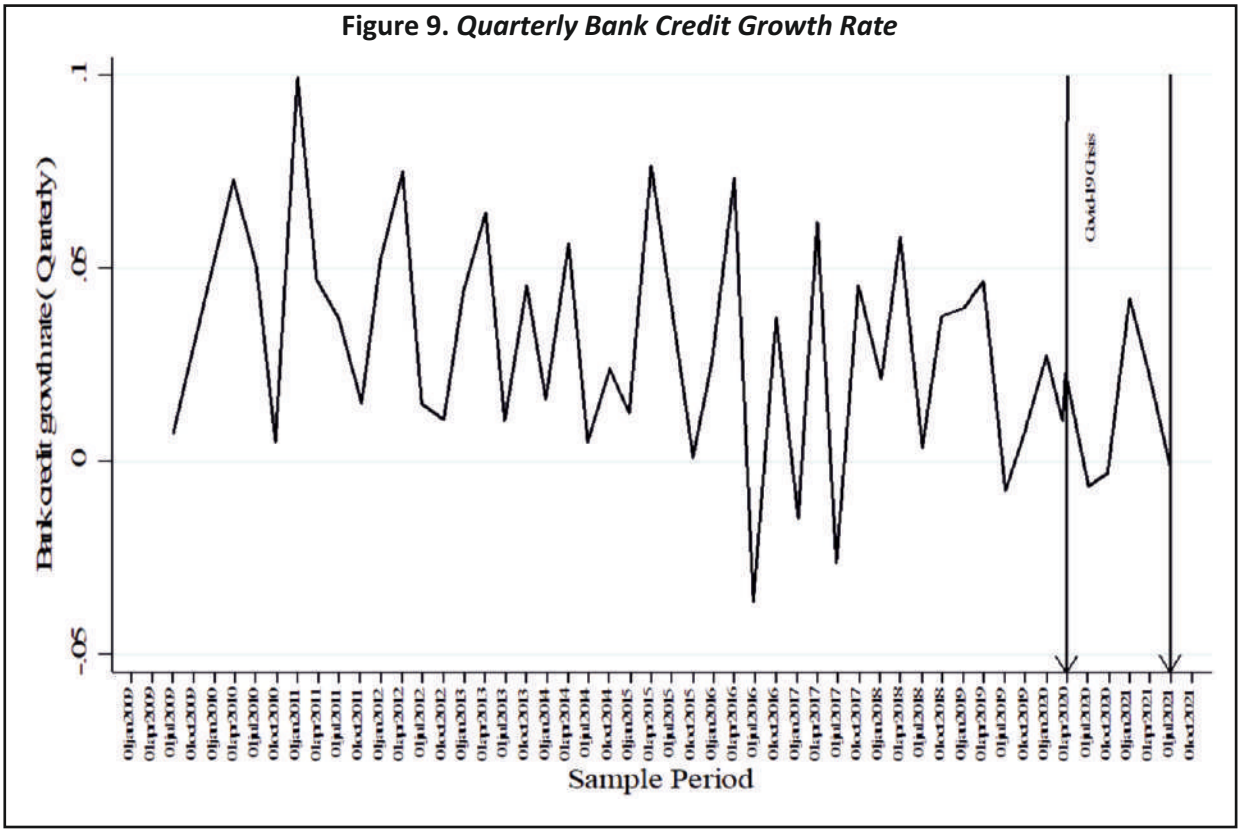


Figure 9. ***Quarterly Bank Credit Growth Rate***



from expanding, even with the RBI's promoting lending. Additionally, the decline in corporate credit demand contributed to a decrease in credit growth (Dev & Sengupta, 2020).

Research Methodology

The study has used the FEM and REM (Equations (1)–(3)) to evaluate the effects of the COVID-19 pandemic on the profitability and SHDTA. It is assumed in FEM that there is a strong time-invariant firm-specific effect that encompasses all possible variables that could contribute to the variability in firm profitability and SHDTA. To further evaluate the variations in the SHDTA determinants during the COVID-19 era, the study employed FEM (Equation 3). As a result, the following equations could represent the chapter's model.

$$SHDTA_{it} = \beta_0 + U_i + \beta_{DCov-19} DCov - 19 + \varepsilon_{it} \quad \text{Equation (1)}$$

$$Profit_{it} = \beta_0 + V_i + \beta_{DCov-19} DCov - 19 + \varepsilon_{it} \quad \text{Equation (2)}$$

$$SHDTA_{it} = \beta_0 + v_i + \beta_1 NDTS_{it} + \beta_2 TANGB_{it} + \beta_3 PROFIT_{it} + \beta_4 SIZE_{it} + \beta_5 LIQ_{it} + \beta_{DCov-19} Dcov{-}19 + \varepsilon_{it} \quad \text{Equation (3)}$$

In Equations (1) – (3), SHDTA and profit are dependent variables where $SHDTA_{it}$ represents the SHDTA of the company *i,* i.e., 4,536 firms at a time *t,* i.e., third quarter of 2008–09 to the first quarter of 2021–2022. The $Profit_{it}$ is the profitability of the organization *i* at the time *t*. In this chapter, the impacts of the pandemic are studied for the manufacturing and services sectors separately. The other explanatory variables, such as $U_{i,}$ $V_{i,}$ and $v_{i,}$ represent the firm-specific time-invariant fixed effect, and ε_{it} is the error term. The intercept, i.e., β_0 denotes the average value of SHDTA and profitability when no explanatory variable is considered in the model. The slope coefficients $\beta_{DCov-19}$

represent the coefficients of the dummy variable, i.e., *DCov–19* for the pandemic. The COVID-19 period is assigned as 1 (if the period is 2019–2020 (last quarter)), 2020–2021 (all four quarters), and 2021–22 (First quarter); otherwise, 0. The non-debt tax shield (NDTS) denotes the ratio of noncash expenses to assets. TANGB stands for tangibility and represents the ratio of tangible assets to total assets. The PROFIT represents the ratio of EBIDTA to the firm's total assets. The SIZE variable is the natural logarithmic value of the firm's sales, and LIQ represents the liquidity, the ratio of current assets in the firms to current liabilities. The additional explanatory variables are considered in the study because they have the most substantial influence on the firm's debt ratio (Frank & Goyal, 2009). In the next part of the study, the estimation results are provided.

Empirical Analysis and Results

The calculated coefficients of Equations 1 to 3 using standard FEM and REM are indicated by the findings given in this section. The findings show that the COVID-19 crisis had a major impact on Indian companies' profitability and SHDTA. Furthermore, the behavior of the SHDTA determinants for the manufacturing and services sectors before and during the COVID-19 crisis is shown in Tables 6 and 7. The results in Tables 2 to 5 indicate that the pandemic has affected the performance and SHDTA of Indian firms substantially and asymmetrically. Furthermore, there are significant differences between the parameters influencing SHDTA and profitability during the regular period and the pandemic.

According to Tables 2 through 7, the COVID-19 epidemic has affected the performance and leverage of Indian enterprises, which is corroborated by the graphical displays. Performance and leverage interruptions differ significantly.

Table 2. ***Impacts of COVID-19 on the Manufacturing Firm's Performance***

	Manufacturing Firms			
	Dependent Variable : ***PROFIT***			
Name of the Sector	**Constant (β_0)**	**COVID-19 ($\beta_{DCov\text{-}19}$)**	**Fixed Effect (V_i)**	***F*-Test**
Manufacturing sector	0.028***	–0.003***	*F* (1047, 9440) = 6.28***	*F* (1, 9440) = 19.77
	(0.000)	(0.00)	(0.000)	(0.000)
Chemicals and	0.0311***	–0.0007	*F* (465, 4385) = 6.25***	*F* (1, 4385) = 0.43
chemical products	(0.000)	(0.513)	(0.000)	(0.513)
Construction materials	0.028***	–0.0009	*F* (97, 1204) = 9.77***	*F* (1, 1204) = 0.26
	(0.000)	(0.608)	(0.000)	(0.607)
Construction	0.022***	–0.010***	*F* (207, 2130) = 3.68***	*F* (1, 2130) = 37.88***
and real estate	(0.000)	(0.000)	(0.000)	(0.000)
Consumer goods	0.033***	–0.007*	*F* (47, 406) = 10.45***	*F* (1, 406) = 3.00*
	(0.000)	(0.084)	(0.000)	(0.084)
Diversified	0.029***	–0.0011	*F* (18, 235) = 4.67***	*F* (1, 235) = 0.05
manufacturing	(0.000)	(0.826)	(0.000)	(0.825)
Electricity	0.024***	–0.007**	*F* (26, 271) = 3.10***	*F* (1, 271) = 4.03**
	(0.000)	(0.046)	(0.000)	(0.045)
Food and agro-based	0.025***	–0.0008	*F* (249, 2587) = 3.99***	*F* (1, 2587) = 0.14
products	(0.000)	(0.713)	(0.000)	0.712

Machinery	0.0263***	–0.007***	*F* (212, 2160) = 5.22***	*F* (1, 2160) = 18.77***
	(0.000)	(0.000)	(0.000)	(0.000)
Metals and metal	0.022***	–0.006**	*F* (105, 1173) = 5.13***	*F* (1, 1173) = 6.81**
products	(0.000)	(0.009)	(0.000)	(0.009)
Mining	0.0254***	–0.007	*F* (26, 209) = 3.04***	*F* (1, 209) = 2.60
	(0.000)	(0.291)	(0.000)	(0.108)
Miscellaneous	0.0280***	–0.007**	*F* (93, 1108) = 7.11***	*F* (11, 108) = 9.54**
manufacturing	(0.000)	(0.002)	(0.000)	(0.002)
Textiles	0.0289***	–0.008***	*F* (280, 3558) = 6.88***	*F* (1, 3558) = 34.65***
	(0.000)	(0.001)	(0.000)	(0.000)
Transport equipment	0.035***	–0.011***	*F* (139, 1759) = 8.20***	*F* (1, 1759) = 45.65***
	(0.000)	(0.00)	(0.000)	(0.000)

Note. *p*-values are given in parentheses.

"*," "**," and "***" denote significance at 10%, 5%, and 1%, respectively.

Table 3. ***Impacts of COVID-19 on the Manufacturing Firm's SHDTA***

Manufacturing Firms				
Dependent Variable : ***SHDTA***				
Name of the Sector	**Constant (β_0)**	**COVID-19 ($\beta_{DCov\text{-}19}$)**	**Fixed Effect (U_i)**	***F*-Test**
Manufacturing sector	0.206***	–0.0206***	*F* (1047, 9440) = 32.21***	*F* (1, 9440) = 49.44***
	(0.000)	(0.000)	(0.000)	(0.000)
Chemicals and chemical	0.204***	–0.0270***	*F* (465, 4385) = 24.45***	*F* (1, 4385) = 42.62***
products	(0.000)	(0.000)	(0.000)	(0.000)
Construction materials	0.155***	–0.0361**	*F* (97, 1204) = 21.51***	*F* (1, 1204) = 30.81***
	(0.000)	(0.043)	(0.000)	(0.000)
Construction	0.203***	–0.0273***	*F* (207, 2130) = 24.58***	*F* (1, 2130) = 18.60***
and real estate	(0.000)	(0.000)	(0.000)	(0.000)
Consumer goods	0.258***	–0.0027	*F* (47, 406) = 39.14***	*F* (1, 406) = 0.06
	(0.000)	(0.846)	(0.000)	(0.800)
Diversified manufacturing	0.184	0.040*	*F* (18, 235) = 14.96***	*F* (1, 235) = 3.14*
	(0.000) ***	(0.0780)	(0.000)	(0.077)
Electricity	0.077***	0.0139	*F* (26, 271) = 17.68	*F* (1, 271) = 2.10
	(0.000)	(0.138)	(0.000)	(0.1482)
Food and agro-based	0.230***	–0.0458***	*F* (249, 2587) = 19.11	*F* (1, 2587) = 58.36
products	(0.000)	(0.000)	(0.000)	(0.000)
Machinery	0.194***	–0.0206***	*F* (212, 2160) = 20.43***	*F* (1, 2160) = 13.71***
	(0.000)	(0.000)	(0.000)	(0.000)
Metals and metal	0.234***	0.0072	*F* (105, 1173) = 16.65***	*F* (1, 1173) = 0.71
products	(0.000)	(0.401)	(0.000)	(0.400)
Mining	0.223***	–0.0246	*F* (26, 209) = 25.11***	*F* (1, 209) = 1.35
	(0.000)	(0.247)	(0.000)	(0.2472)

Miscellaneous	0.182***	–0.0246***	*F* (93, 1108) = 24.89***	*F* (1, 1108) = 11.26***
manufacturing	(0.000)	(0.000)	(0.000)	(0.000)
Textiles	0.226***	–0.004	*F* (280, 3558) = 25.71***	*F* (1, 3558) = 0.83
	(0.000)	(0.363)	(0.000)	(0.363)
Transport equipment	0.149***	–0.010**	*F* (139, 1759) = 24.21***	*F* (1, 1759) = 5.86**
	(0.000)	(0.016)	(0.000)	(0.015)

Note. *p*-values are given in parentheses.

"*," "**," and "***" denote significance at 10%, 5%, and 1%, respectively.

Table 4. ***Impacts of COVID-19 on the Services Firm's Performance***

Services Firms				
Dependent Variable : ***PROFIT***				
Name of the Sector	**Constant (β_0)**	**COVID-19 ($\beta_{DCov\text{-}19}$)**	**Fixed Effect (V_i)**	***F*-Test**
Services sector	0.023***	–0.009***	*F* (848, 6061) = 4.37***	*F* (1, 6061) = 46.56***
	(0.000)	(0.00)	(0.000)	(0.000)
Communication services	0.015***	–0.011	*F* (22, 215) = 1.88**	*F* (1, 215) = 1.18
	(0.000)	(0.278)	(0.0124)	(0.2784)
Diversified services	0.0242***	–0.004	*F* (43, 261) = 2.56	*F* (1, 261) = 0.52
	(0.000)	(0.470)	(0.000)	(0.469)
Hotel and tourism	0.0195***	–0.0155***	*F* (53, 549) = 5.89***	*F* (1, 549) = 18.25***
	(0.000)	(0.000)	(0.000)	(0.000)
Information technology	0.034***	–0.007*	*F* (122, 826) = 5.54***	*F* (1, 826) = 3.80*
	(0.000)	(0.052)	(0.000)	(0.0515)
Miscellaneous services	0.021***	–0.012***	*F* (206, 1414) = 4.04***	*F* (1, 1414) = 11.92***
	(0.000)	(0.001)	(0.000)	(0.000)
Transport services	0.027***	–0.013***	*F* (46, 486) = 5.58***	*F* (1,486) = 7.93***
	(0.000)	(0.005)	(0.000)	(0.005)
Wholesale and	0.019***	–0.006***	*F* (355, 2381) = 3.72***	*F* (12, 381) = 10.32***
retail trading	(0.000)	(0.001)	(0.000)	(0.000)

Note. *p*-values are given in parentheses.

"*," "**," and "***" denote significance at 10%, 5%, and 1%, respectively.

Table 5. ***Impacts of COVID-19 on the Services Firm's SHDTA***

Services Firms				
Dependent Variable : ***SHDTA***				
Name of the Sector	**Constant (β_0)**	**COVID-19 ($\beta_{DCov\text{-}19}$)**	**Fixed Effect (U_i)**	***F*-Test**
Services sector	0.015***	–0.0207***	*F* (848, 6061) = 18.38***	*F* (1, 6061) = 37.70***
	(0.000)	(0.000)	(0.000)	(0.000)
Communication services	0.181***	0.0239	*F* (22, 215) = 37.64***	*F* (1, 215) = 1.31
	(0.000)	(0.254)	(0.000)	(0.254)
Diversified services	0.187***	–0.0545**	*F* (43, 261) = 8.18**	*F* (1, 261) = 6.67**

	(0.000)	(0.010)	(0.010)	(0.010)
Hotel and tourism	0.1025***	–0.0138	*F* (53, 549) = 34.74***	*F* (1, 549) = 1.98
	(0.000)	(0.160)	(0.000)	(0.160)
Information technology	0.125***	–0.0177*	*F* (122, 826) = 32.36	*F* (1, 826) = 3.83*
	(0.000)	(0.051)	(0.000)	(0.508)
Miscellaneous services	0.162***	0.0139	*F* (206 ,1414) = 15.66***	*F* (1, 1414) = 1.10
	(0.000)	(0.294)	(0.000)	(0.294)
Transport services	0.130***	0.0151	*F* (46, 486) = 25.83***	*F* (1, 486) = 2.39
	(0.000)	(0.123)	(0.000)	(0.122)
Wholesale and	0.215***	–0.0238***	*F* (355, 2381) = 13.11***	*F* (1, 2381) = 9.36
retail trading	(0.000)	(0.002)	(0.000)	(0.002***)

Note. *p*-values are given in parentheses.

"*," "**," and "***" denote significance at 10%, 5%, and 1%, respectively.

Table 6. ***Impacts of COVID-19 on the Determinants of SHDTA for Manufacturing Firms***

	Manufacturing Firms		
	Dependent Variable : ***SHDTA***		
Independent Variables	**Full Sample Period**	**Pre-COVID-19 Period**	**During COVID-19 Period**
INTERCEPT	0.3574***	0.3889***	0.2270***
	(0.0000)	(0.0000)	(0.0000)
NDTS	3.731***	3.0216***	–0.4544
	(0.0000)	(0.0000)	(0.425)
TANGB	–0.0283**	–0.0310**	–0.0317
	(0.0320)	(0.0180)	(0.1920)
PROFIT	–0.2325***	–0.2628***	–0.2003***
	(0.0000)	(0.0000)	(0.0000)
SIZE	–0.0263***	–0.0253***	–0.0108***
	(0.0000)	(0.0000)	(0.0000)
LIQ	0.003***	0.004***	0.0077***
	(0.0000)	(0.0050)	(0.0000)
DCov-19	–0.0204***	NA	NA
	(0.0000)		
Observations	10,489	10,333	3,590
No. of Firms	1,048	1,106	1,350
F-Stat (Fixed Effect)	*F* (1047, 9435) = 23.36***	*F* (1887, 17823) = 27.24***	*F* (1349, 2235) = 27.32***
F (1983, 21384)	(0.0000)	(0.0000)	(0.0000)
F-Stat (Variables)	*F* (6, 9435) = 88.88***	*F* (5, 9222) = 88.65***	*F* (5, 2235) = 30.89***
F (5, 21384)	(0.0000)	(0.0000)	(0.0000)
Hausman Test	346.59***	129.68***	81.09***
	(0.0000)	(0.0000)	(0.0000)

Note. *NDTS, TANGB, LIQ,* and *DCov-19* represent non-debt tax shield, tangibility, liquidity, and dummy variables for the COVID-19 period in the firm, respectively. The *p*-values are given in parentheses. "*," "**," and "***" denote significance at 10%, 5%, and 1%, respectively.

Table 7. ***Impacts of COVID-19 on the Determinant SHDTA for Services Firms***

	Services Firms		
	Dependent Variable : *SHDTA*		
Independent Variables	**Full Sample Period**	**Pre-COVID-19 Period**	**During COVID-19 Period**
INTERCEPT	0.1721***	0.1825***	0.1057***
	(0.0000)	(0.0000)	(0.0000)
NDTS	1.4250***	1.1553***	1.1454
	(0.0000)	(0.0000)	(0.1120)
TANGB	–0.0051	–0.0055	0.0067
	(0.6530)	(0.6590)	(0.891)
PROFIT	–0.2139***	–0. 1991***	–0.0642
	(0.0010)	(0.0000)	(0.1980)
SIZE	–0.0041***	–0.0053***	0.0003
	(0.0080)	(0.0040)	(0.8950)
LIQ	0.0010***	0.0011***	0.0012**
	(0.0000)	(0.0000)	(0.0210)
DCov-19	–0.0244***	NA	NA
	(0.0000)		
Observations	6,911	5,767	1,144
No. of Firms	849	794	475
F-Stat (Fixed Effect)	*F* (848, 6056) = 17.47***	*F* (793, 4968) = 16.43***	*F* (474, 664) = 22.22***
F (1983, 21384)	(0.0000)	(0.0000)	(0.0000)
F-Stat (Variables)	*F* (6, 6056) = 26.08***	*F* (5, 4968) = 17.15***	*F* (5, 664) = 1.92*
F (5,21384)	(0.0000)	(0.0000)	(0.0888)
Hausman Test	39.54***	31.56***	21.16***
	(0.0000)	(0.0000)	(0.0008)

Note. *NDTS, TANGB, LIQ,* and *DCov-19* represent non-debt tax shield, tangibility, liquidity, and dummy variables for the COVID-19 period in the firm, respectively. The *p*-values are given in parentheses. "*," "**," and "***" denote significance at 10%, 5%, and 1%, respectively.

For instance, the highest fall in profitability for the manufacturing sector is reported by the transportation and ancillary equipment firms (–0.011); whereas, the chemical industry experiences the smallest decline in their profitability (–0.0007). In the case of the services sector, the highest fall in profitability was seen for the hotel industry (–0.015), transport services (–0.013), and miscellaneous services (–0.012); whereas, the lowest fall was experienced by the wholesale and retail industry (–0.006). The average quarterly decline in the performance of the services sector (–0.009) is more than the decline in the manufacturing sector (–0.003). The findings highlight that the severity of the crisis for services sectors in India is higher than in the manufacturing sector.

The possible explanations behind the significant decline in the performance of Indian industries may be linked to the government's lockdown, social distancing, and quarantine measures to mitigate the COVID-19 crisis. The government's adopted policies limited people's ability to travel and work. Supply shocks, or the scarcity of labor and capital for the production process, have been encouraged by the Indian government's response. After the state borders were locked, a sizable portion of the labor force working in Indian enterprises either moved to

government-organized shelters or returned to their hometown. Businesses discovered that the available finances were insufficient to support their operations. These extraordinary actions have also brought on demand shocks from lower consumer income and more unemployment. As a result, customers only sought necessities, suspending their need for non-essentials.

Additionally, Indian firms are highly dependent on foreign trade. They could not import the required intermediate goods for their final products because of the restrictions on the movement of goods and workforce across the world during this period. Furthermore, the manufacturing share in the total export of the Indian economy is more than 60%, and consumption in economies such as the Chinese, European, and American economies are badly affected by COVID-19. Moreover, the export share of Indian manufacturers is the labor-intensive products from the food and agro, textiles and jewelry sectors. These sectors are exceedingly dependent on migrant workers who returned to their homes during the pandemic; hence, the shortage of workforce and capital inversely affected the performance of manufacturing and services firms (Dev & Sengupta, 2020).

Tables 3 and 5 also show that the COVID-19 pandemic has a detrimental impact on Indian enterprises' demand for SHDTA. The manufacturing and services sectors in India have had unequal declines in the SHDTA. For instance, the manufacturing sector has reduced the SHDTA by 0.020, whereas the demand by the services sector contracted by 0.0244. Notably, the drop in the demand for short-term loans within the manufacturing sector is also unequally distributed; for example, the highest reduction in SHDT is made by the food and agro (–0.0458) followed by diversified (–0.040) and construction materials (–0.0361) areas of manufacturing sectors.

The possible reasons for the decline in SHDTA may be attached to the demand, market, and supply shocks that have left Indian firms to operate with a limited number of workers or shut down their operations. The companies' income and worker productivity have stopped due to both of the available options. Consequently, the corporations' destructive response to the cascading impacts of the supply and demand shocks was huge worker layoffs and decreased production. The company's need for working capital significantly decreased as a result of these policy adjustments. As a result, the companies' demand for short-term loans has decreased.

The fall in short-term loans also indicates that the COVID-19 measures have compelled Indian firms to shut down their businesses or work in an under-utilized capacity. The curtailed production led to a sharp decline in the demand for short-term finance. Additionally, the SHDTA represents the ratio of short-term loans to total assets in place of the firm. One of the prime motives for availing the short-term loans by a firm is the lag in the time between payment of current expenses and receipt of current assets. During the COVID-19 period, the current expenses and current assets declined because of curtailed production by the firms. Therefore, the firms shortened their demand for short-term loans.

Furthermore, the banks are treated as the first resort in the case of deficit finance. However, before the crisis, the banking sector in India was functioning with high NPAs and focused on household lending during the onset of the COVID-19 crisis. Moreover, the non-accessibility of formal finance to the firms, lower probability of getting loans from banks and declined investment demand by companies have further wrecked the demand for short-term loans by Indian firms. Although the central bank reduced the repo rates several times during the pandemic, the banks portrayed their heightened risk aversion in lending money to corporates. Moreover, the Indian banks deposited the money back to the central bank despite the historically low cash reserve ratio. All these spillover effects stimulated the negative impacts of the crisis on the SHDTA of the Indian firm (Dev & Sengupta, 2020; Rathore & Khanna, 2020).

Additionally, Céspedes et al. (2020) argued that the COVID-19 pandemic had created a vicious circle for firms across the globe. For instance, the government's lockdown, social distancing, and quarantine measures have reduced the firms' productivity, leading to a fall in the value of the collateral. The fall in the collateral resulted in capping the firm's borrowing capacity and led to a fall in employment opportunities, further leading to a reduction in demand and production. Hence the cascading effects guided the significant fall in the SHDTA of the firm.

Consequently, the data indicate a significant change in the variables influencing the enterprises' SHDTA over the COVID-19 period, answering the question of whether or not the crisis has changed the SHDTA determinants. For instance, the SHDTA of manufacturing firms is significantly impacted by their size, liquidity, and profit. The SHDTA is directly impacted by liquidity; however, it is inversely correlated with the firm's size and profit. Unlike industrial industries, the services sector's SHDTA has been impacted by the firm's liquidity during the COVID-19 pandemic. The results suggest that large and profitable firms tend to finance their working capital requirements with internally generated funds; therefore, they are inclined to have lower SHDTA. The availability of liquidity in the firms directly influences the SHDTA of the firms. The possible explanation for this behavior may be that large and profitable firms tend to have sufficient internally generated funds; therefore, they need not borrow from outside. High liquidity in the firms is the yardstick of the short-term solvency of the firm; therefore, manufacturing firms with high liquidity ratios quickly get access to external finance.

The results further emphasized that, for services firms, liquidity is the only factor that determines SHDTA and that, generally speaking, a firm with higher liquidity will have less demand for SHDTA. Moreover, it suggests that the sample's services firms often have greater liquidity and do not require external borrowing. This pattern may be explained by the fact that a company does not need further financing when it has more current assets than current liabilities on its balance sheet because it is expecting to receive the money soon. The following and final section provides a summary of the paper.

Conclusion and Implications

The COVID-19 pandemic has induced demand, supply, and market shocks for Indian firms. Consequently, the performance and short-term financing decisions of Indian firms were affected severely. In this context, the current study enriches the literature by finding answers to related questions such as, how has the pandemic affected the profitability and short-term financing decisions of Indian firms? What factors determine the SHDTA of Indian firms during COVID-19, and how are they different from regular times? These crucial questions are answered by employing a quarterly novel dataset of 4,536 Indian manufacturing and service firms for the 2008–2009 to 2021–2022 time period. For the estimation process, the study employed linear panel models. The outcomes of this research show that the pandemic has differential impacts on the performance of Indian firms; for the manufacturing sector, the highest fall in profitability was reported by the transportation and ancillary equipment firms (–0.011), construction activities (–0.010), textiles (–0.008), and heavy machinery (–0.007) industries. In the case of the service sector, the highest fall was reported by the hotel industry (0.0155), followed by transport services, whereas the lowest reduction in profit was experienced by the wholesale and retail industry (0.006). The results indicate that the SHDTA of Indian firms declined significantly during the crisis.

Most importantly, the findings report significant changes in the factors determining the SHDTA of the firms during the COVID-19 period. For instance, the SHDTA of manufacturing firms is determined by profit, size, and liquidity. The profit and size of the firm inversely affected the SHDTA, and liquidity directly affected the SHDTA. For services firms, liquidity is the sole determinant of the SHDTA of the firm during the COVID-19 crisis. Therefore, the study advocates that the policymakers in India should ensure timely and adequate liquidity for the firms in India during this pandemic.

Limitations of the Study and Scope for Further Research

The current study presents detailed research on the impact of COVID-19 on the performance and short-term financing decisions of Indian firms but leaves some unanswered questions. For example, the current study is silent on the impact of the crisis on long-term financing. A separate study will also be undertaken to evaluate the role of

government bailout packages during the crisis. The application of non-linear regression is also lurking in the interest of researchers to study the financing decisions of Indian firms.

Authors' Contribution

Dr. Sandeep Vodwal conceived the idea and developed the quantitative research methods. Dr. Lata Vodwal extracted the related literature and the origin of the subject and filtered these based on her knowledge. Dr. Lata Vodwal further designed the introduction and review of the literature parts of the paper. Both authors jointly undertook the written part of the manuscript.

Conflict of Interest

The authors certify that they have no affiliations with or involvement in any organization or entity with any financial interest or non-financial interest in the subject matter or materials discussed in this manuscript.

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